DOCUMENT RESUME

ED 310 384 CS 211 957

AUTHOR Lovejoy, Kim Brian
TITLE Discourse Analysis: Part II, A Comparison of Published Writing in Three Disciplines.
PUB DATE Aug 88
NOTE 47p.; Preliminary version of this paper was presented at the International Systemic Congress (15th, East Lansing, MI, August 1988). A shorter version of this paper was presented at the Annual Meeting of the Conference on College Composition and Communication (40th, Seattle, WA, March 16-18, 1989). For part I, see CS 211 956.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Biology; *Cohesion (Written Composition); Counseling; *Discourse Analysis; Higher Education; History; Language Research; Models; *Writing Across the Curriculum; *Writing for Publication; Writing Research
IDENTIFIERS Academic Discourse Communities; Information Management (Written Composition); Text Factors

ABSTRACT

Combining linguistics and composition studies in a two-part article (in which part 1 presented the principal concepts of cohesion and information management used in spoken and written discourse) this paper, part 2, describes a model that applies some of these concepts in analyses of the content of samples of published writing in three disciplines (counseling psychology, biology, and history); discusses the findings of the analyses; and makes suggestions on how the findings can be applied in future research and teaching. The paper reports that chi-square comparisons of data revealed significant differences in cohesive density and in comparisons of the use of lexical ties: types, number of words entering into lexical ties, and the distribution of lexical ties in themes and rhemes. Fewer significant differences in distributions of ties were found in themes than in rhemes, suggesting significant differences in the ways in which given and new information are managed in diverse disciplines. Eight tables of data are included. Twenty-six references and two appendixes (one containing tables showing levels of significance of chi-square tests of comparisons of data on cohesion and information management, and one discussing methodology) are attached. (SR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Kim Brian Lovejoy
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED310384

Discourse Analysis: Part II, A Comparison of Published Writing in Three Disciplines

Kim Brian Lovejoy
Department of English
Indiana University/Indianapolis

Author Notes

A preliminary version of this article was presented at the Fifteenth International Systemic Congress at Michigan State University in August 1988. Preparation of the article for publication was supported by summer research grants from the President's Council on Arts and Science and from the School of Liberal Arts, Indiana University/Indianapolis.

The author wishes to express his indebtedness to Professor Donald M. Lance for his numerous comments on drafts of this article.

Correspondence and requests for reprints should be sent to the author, Department of English, CA 502J, 425 University Boulevard, Indiana University, Indianapolis, IN 46202.

Running Head: A Comparison of Published Writing in Three Disciplines

CS211957

BEST COPY AVAILABLE

Abstract

Part I of this two-part article presented the principal concepts of cohesion and information management used in spoken and written discourse. Part II describes a model that applies some of these concepts in analyses of the content of samples of published writing in three disciplines (counseling psychology, biology, and history); discusses the findings of the analysis; and makes suggestions on how the findings can be applied in future research and teaching. Chi-square comparisons of data revealed significant differences ($p < .01$) in cohesve density and in comparisons of the use of lexical ties: types, number of words entering into lexical ties, and the distribution of lexical ties in themes and rhemes. Fewer significant differences in distributions of ties were found in themes than in rhemes, suggesting significant differences in the ways in which given and new information are managed in diverse disciplines.

Discourse Analysis: Part II, A Comparison of Published Writing in Three Disciplines

Much composition research in the last two decades has focused on the writing and behavior of students in language arts or English composition classes, resulting in valuable knowledge about the writing process and the teaching of written composition. With the development of a more social view of the writing process and the burgeoning of writing-across-the-curriculum programs at colleges and universities across the country, many new questions about the nature and function of writing have challenged researchers to examine how texts differ in academic and nonacademic contexts. In the late 70s, Lee Odell, Dixie Goswami, and others interested in "professional" writing began to investigate the kinds of writing done in work environments outside of academia on the assumption that our writing courses should help prepare students for the challenges that lie ahead in their careers (Odell and Goswami, 1986). At about the same time, writing-across-the-curriculum programs were leading composition specialists to question basic assumptions about writing and pedagogy and to hypothesize that the conventions characterizing writing in English composition courses may not be universally applicable to writing in other disciplines or, for that matter, to writing outside the academy. Teachers of writing, in other words, were beginning to realize that their attitudes and beliefs about "good" writing were not shared, necessarily, by writers in other disciplines.

Porter has argued, for example, that we have tended to

"romanticize composition" by viewing writing "as individual, as isolated, [and] as heroic," to the detriment of the student: "This partial picture of the process can all too readily become the picture, and our students can all too readily learn to overlook vital facets of discourse production" (1986, 41,46). Kinneavy maintains that to prepare students, teachers of writing must be familiar with the internal "axiomatics" of a discipline if they want their students to write well in varied situational contexts (1983). The notion of a "discourse community"--a community of writers and readers who share the same expectations about writing--has come to represent what teachers and researchers are learning about discourse conventions and the beliefs and practices common to a "community" of readers and writers. Writing done in English composition courses, as in any classroom setting across the curriculum, is now viewed as a "discourse community" in its own right, and researchers are beginning to explore the nature and uses of writing in a variety of settings. Commenting on the last two decades of composition research, Chris Anson writes that "in our zeal to understand the complexities of the writing process, we've neglected to consider ways that specific discourse communities might influence writers' attempts to formulate and express their ideas" (1987). Other researchers, such as Bizzell (1982), Maimon (1982), and Kinneavy (1983), have noted the correlation between successful writing and the writer's sensitivity to specific contexts. Thus, research in composition must examine more fully the dynamics of context in the production of discourse in both academic and nonacademic communities--the ways in which varying contexts influence the decisions that

writers make in the act of composing.

While researchers have long been interested in the characteristic linguistic features of scientific writing (Huddleston, 1971; Gopnik, 1972; Cheong, 1978; Hopkins, 1979), comparatively few studies have examined the similarities and differences in writing in different academic communities. Such research began most notably with Charles Bazerman's analysis of scholarly articles in molecular biology, sociology, and literary criticism. Bazerman examined each article with respect to the author's perceptions of the object under study, the literature of the field, the audience, and the author's persona (1981). Other similar studies of a wide range of disciplinary writing followed (Secor and Fahnestock, 1982; McCloskey, 1983; Faigley and Hansen, 1985; Miller and Selzer, 1985; MacDonald, 1987; Swales and Najjar, 1987). Most recently, two books on academic writing have appeared (Brodkey, 1987; Bazerman, 1988), as well as a collection of articles reporting the latest research on writing in the disciplines (Jolliffe, 1988). These works together represent a new and exciting direction for research in composition.

In this paper, I examine samples of cross-disciplinary writing from a linguistic perspective. Using models derived from linguistic theories of cohesion and information management, I discuss the cohesion and information management strategies employed by three writers of discipline-specific texts and suggest that such strategies contribute to our understanding of writing in the disciplines and have clear implications for teachers of writing-across-the-curriculum and for teachers of reading in the

content areas. Thus, the two models serve as means of identifying cohesive patterns in samples of good writing from different disciplines and of illuminating how information is distributed so as to make the passages optimally complete and understandable for typical readers of the journals in which they are published. The findings clearly suggest that the patterning of cohesive ties and variations in the information structure of these sample texts provide a means of comparing written texts from different disciplines; because this study is a preliminary one, no claims are made about the "typicality" of texts in the disciplines represented here.

Methodology

The corpus of data used for this study is the introductory sections of three scholarly articles selected from three disciplines that represent the major divisions of the academy (social sciences, physical sciences, and humanities) and that often participate in writing-across-the-curriculum programs--counseling psychology, biology, and history. These articles were judged by representatives of the disciplines to be instances of good writing and to have the quality of "texture" that results from effective use of cohesion and information management. The introductory sections were used rather than other sections (e.g., "body," "conclusion") because in all three articles the introductory sections were easily distinguishable and had a comparable number of paragraphs. In the articles from psychology and biology, the introductory sections, as well as other sections, are identified by the use of generic headings, whereas in the

history article, only an extra line space following the introductory section separates it from the remainder of the essay. No other divisions in the history article are apparent.

Because of the small size of these sample passges, the number of variables that could be controled was limited to (1) the quality of writing, (2) genre, and (3) section of the article. In these disciplines, other sections of scholarly articles (e.g., "methods," "results," etc.) or articles treating other topics, or written by other writers, or published by other journals may have quite different statistical distributions than those presented here. Since the principal goal of the study was to propose and test a model for comparing cohesion and information management in different disciplines, and since the findings are derived only from the introductory sections of one article from each of the disciplines, the study represents only a preliminary step in answering questions about similarities and differences in writing in diverse disciplines. Nonetheless, because so many of the differences found in the introductory sections were significantly different beyond the criterion level of $p < .01$, one might hypothesize that other comparisons of introductory sections of published articles in these three disciplines (or in similar disciplines) would yield significant results, though the data on cohesion and information management may be distributed in different proportions when other variables are included in the selection of the corpus being analyzed.

In the analysis of the data, the chi-square procedure was used to determine statistically significant differences but only

when the numbers in the expected category were high enough for statistical validity ($n > 5$). Tables showing levels of significance of chi-square comparisons of data on cohesion and information management are included in Appendix 1. These tables correspond to the tables appearing in the text of the paper. In the discussion that follows, the criterion for level of significance was set at $p < .01$ because of the small size of the writing samples.

The principal concepts used in the analysis of cohesion and information management are defined in Part I of this two-part article. A description of the coding procedures and illustrations of the analysis can be found in the Appendix 2.

Analysis of Data: Cohesion Strategies

The analysis of cohesion revealed differences in the relative number of cohesive ties used by each of the writers from the three disciplines. The total number of ties as a ratio of the total word count, as Table 1 shows, provides a good index of cohesive density in each of the passages.

Table 1

Comparison of Total Number of Cohesive Ties and Word Counts in Three Sample Passages

	Counseling Psychology	Biology	History
Total No. of Ties	699	284	332
Words in Text	689	376	496
Ratio: Ties to Word Count	1.01	.76	.67

The psychology passage contained the most ties, with a ratio of ties to total word count of 1.01; this high ratio can be

attributed to the fact that a given word may be used in more than one kind of lexical tie (see Haswell, 1988). The biology passage ranked second with a ratio of .76, and the history passage ranked third with a ratio of .67. The chi-square procedure revealed that the passage in psychology had significantly higher cohesive density than either of the other two passages, and the passage in biology had significantly higher cohesive density than the passage in history. Each passage was significantly different from each of the other two at the .001 level.

The majority of intersentential cohesive ties in each passage occurred in the lexical category, as Table 2 illustrates. Lexical ties ranged from 93% to 96% of the total number of ties in each of the sample passages. The numbers of referential, conjunctive, and elliptical ties were too small to justify drawing any conclusions, but studies of longer passages would lead, in all probability, to meaningful differences in the distribution of these non-lexical ties. Since the lexical ties were by far the most interesting and revealing in the analysis of cohesion, this article will focus on the similarities and differences in the types of lexical cohesion used by the writers of these sample texts.

The high cohesive density in the psychology passage (see Table 1) is rather interesting since this passage is proportionately very similar to the biology passage in all of the subsets of lexical cohesion. The differences in the total numbers of ties in these two passages cannot be attributed to the relative frequency of any particular type of lexical tie.

However, the relative frequencies of the types of lexical ties in both the psychology and biology passages are proportionately very different from the history passage, which is also lowest in cohesive density. The psychology and biology passages were proportionately similar in their use of repetition, synonomy, and collocation, and significantly different from the history passage

Table 2

Tabulation of Intersentential Cohesive Ties in Three Passages

	Counseling Psychology		Biology		History	
Total No. of Ties	699		284		332	
		Referential Ties				
	N	% of Ties	N	% of Ties	N	% of Ties
Pronominals	1	.001%	0	0%	2	.006%
Dem. & Def. Art.	19	.027%	13	.045%	8	.024%
Comparatives	7	.010%	0	0%	0	0%
TOTAL	27	.038%	13	.045%	10	.030%
		Conjunctive Ties				
Additive	4	.006%	0	0%	1	.003%
Adversative	0	0%	0	0%	3	.009%
Causal	3	.004%	1	.004%	0	0%
Temporal	1	.001%	1	.004%	0	0%
TOTAL	8	.011%	2	.008%	4	.012%
		Elliptical Ties				
Nominals	1	.001%	6	.021%	0	0%
		*****LEXICAL TIES*****				
Repetition	213	30%	89	31%	64	19%
Synonomy	119	17%	38	13%	31	9%
Inclusion	127	18%	64	22%	63	19%
Collocation	81	12%	44	15%	69	21%
Derivation	118	17%	26	9%	87	26%
Contrast	5	1%	2	1%	4	1%
TOTAL	663	95%	263	93%	318	96%

in the numbers of these types of ties. The history passage used proportionately fewer repetitions and synonyms and more collocations and derivations. None of the differences in the numbers of inclusions with respect to the total numbers of lexical ties in each passage were significant at the .01 level. The number of contrasting words in each passage was very small, averaging 1% in each of the passages; because the expected frequencies of contrastive ties in biology and history were below 5, this subset was excluded from the chi-square analyses of data.

The high numbers of repetitions and synonyms in the two science passages occur because scientists define very narrow topics about which they generate much detail. Repetition and synonomy are used when it is necessary for the writer to reiterate a topic in a discourse, either by repeating the same word or by using another word similar in meaning. In order to make their arguments complete, the writers of the psychology and biology passages make repeated use of technical terminology, whereas--in the history passage--the writer has considerably more referential freedom because the discourse topic is more general and the writer can choose from a variety of topics on which to write. In the history passage, for example, the writer addresses two questions concerning the topic of journalism in the East versus journalism in the West and, in doing so, examines various aspects of journalism. The proportionately high number of collocations in the history passage, in contrast to the psychology and biology passages, indicates that new but related ideas are more likely to be introduced in the discussion of journalism than

in discussions of scientific experiments. The history passage also has a proportionately high number of derivations, in part because the writer, in examining various aspects of the topic, inevitably employs derivatives of the key word journalism (i.e., journalists, journalist's, journalistic). Derivations are used when the syntax demands a different form of a word that occurred in a preceding sentence. The biology passage, on the other hand, has more referential contraints, and because the focus of the research is on a very limited, specific topic, namely radiation in polonium-210 and lead-210, there is a need for more lexical reiterations. In fact, because repetition and synonyms must occur frequently in the biology passage, the writer uses nominal ellipsis ties (6 in the biology passage as opposed to 1 and 0 in the psychology and history passages, respectively) as a kind of stylistic feature that allows the writer to avoid having to repeat the same key word continually (e.g., "The concentration [of 210-polonium] in mainstream smoke is about 0.5 to 1.0 pCi/g of smoke tar," where of 210-polonium is the elliptical element). Thus, the biology passage uses a high number of inclusions followed by an ellipsis of the repeated word(s).

One explanation for the frequency of ties in the psychology passage can be found in the nature of the subject matter in the article and the organization of information within and between paragraphs. For example, the opening sentence in the psychology passage contains several key terms that are repeated throughout the succeeding paragraphs (e.g., first impressions, stereotypes, behavioral confirmation, and others). Each paragraph discusses the effects of first impressions on the way people interact with

others and how these interactions affect the behavior of the individuals. One paragraph reports on how first impressions affect people's perceptions of physical attractiveness; another paragraph relates how first impressions or impressions in general influence people's perceptions of mental patients; another paragraph reports on how first impressions affect the way people perceive others who seek professional counseling; and the final paragraph discusses the authors' use of these concepts in their own experiment. The biology passage follows in similar fashion, but there are fewer key terms in the opening sentence (only polonium-210 and lead-210) and the progression of topics is more rapid because there is less to say about each related topic than there is in the psychology passage. Moreover, related topics in the biology passage are not developed in separate paragraphs as they are in the psychology passage.

It is easy to see why the parallel cases in the psychology passage would require more cohesive devices: there are not only more topics that interweave throughout the discourse, but there is also more that needs to be said in order to set the stage for the ongoing research. On the other hand, the history passage, which uses the lowest number of cohesive ties, deals with two fairly general aspects of a single topic--journalism in the East versus journalism in the West. Consequently, cohesive ties are fewer in number, in addition to tending to be longer in number of words per tie (see discussion below). Thus one would expect (as was found) that the number of cohesive ties in biology would be higher than those in history but not as high as those in psychology.

Another interesting difference in comparisons of the three passages is the number of words that enter into cohesive chains. In professional articles on rather complex topics, as the argument is developed, it is often necessary to repeat references several times or to show other--sometimes multiple--semantic relations between words or phrases for purposes of textual cohesion. These chains of references were coded in the analysis as dual and multiple chains of ties (see Appendix 1). Table 3 displays the number of single, dual, and multiple ties and indicates the total number of words entering into these chains of ties and the average number of words used in each chain.

None of the comparisons of the numbers of ties in the three passages were significant--neither the single ties, dual/multiple ties, nor ties embedded within chains. There were, however, some significant differences in the numbers of words in single ties in the three passages. Comparisons of the number of words per single tie were significant for all except the biology and history passages, though this comparison approached significance ($p < .05$). None of the comparisons of number of words in longer chains were significant or even approached significance. Because of the similar proportions of the number of words in dual/multiple chains across the three disciplines, none of the comparisons involving number of words in dual-multiple ties--neither within or across disciplines--were significant at the .01 level; however, the comparisons approached significance when one of the variables was the number of ties in the psychology passage, which had a relatively low average of words per tie (1.96).

Table 3

Single, Dual, and Multiple Lexical Ties

	Counseling Psychology	Biology	History
Single Lexical Ties			
Total No.	24	14	10
Words in Ties	47	38	60
Words per Tie	1.96	2.71	6.0
Dual/Multiple Ties			
Total No.	81	40	39
Words in Ties	332	132	228
Words per Tie	4.10	3.30	5.85
Ties Ebmbedded within Chains	558	209	269
Single and Dual/Multiple Chains Combined			
Total Ties	105	54	49
Words in Ties	379	170	288
Words per Tie	3.61	3.15	5.88

Though the psychology and biology passages use a greater number of cohesive ties than the history passage, there are more words in single lexical ties in the history passage than in the other two passages. The writer of the history passage must use periphrastic constructions more often in single references because the writer cannot rely on technical terminology as often. In the history passage, for example, "supplier of information" functions as a lexical inclusion for "journalists," and "reportable events and utterances" as a substitute for "news" or "information."

A summary of the intersentential lexical ties in Table 4 shows one measure of the lexical density in the psychology and

biology passages, as well as the high percentage of words that enter into cohesive ties in the history passage.

Table 4

Summary of Intersentential Lexical Ties

	Counseling Psychology	Biology	History
Total Words in Texts	689	376	496
Number of Lexical Ties	663	263	318
Ratio: Lexical Ties to Total Words	.96	.69	.64
Words in Lexical Ties	379	170	288
Ratio of Words in Ties to No. of Words in Text	.55	.45	.58

The ratio of total lexical ties to total words in each passage reveals that the psychology passage, with a ratio of .96, uses a greater number of lexical ties than either the history or the biology passages, with ratios of .64 and .69, respectively. The pattern here, as expected, follows the pattern of the ratios given in Table 1.

The percentage of words in lexical ties with respect to total number of words in text was highest in the history passage (58%), followed by psychology (55%), and then biology (45%). Thus, although the psychology and biology passages are higher in lexical density than the history passage, the history passage has a greater percentage of words that enter into lexical ties. The biology and history passages were significantly different at the .01 level in the total numbers of words in lexical ties, and all except the psychology and history passages approached

significance ($p < .05$). Because the psychology passage has much higher cohesive density, it has a larger percentage of its words (55%) in lexical ties than does the biology passage (45%).

Analysis of Data: Information Strategies

In addition to employing different cohesive patterns, the writers of these sample texts also use different strategies to distribute information in their texts. In order to achieve their communicative purposes, writers mark sentences within texts by placing given and new information in strategic locations in the themic and rhemic portions of sentences. The total number of marked and unmarked clauses in relation to the total number of main clauses is given in Table 5.

Table 5

Percentage of Marked and Unmarked Clauses in Relation to Total Number of Main Clauses

	Main Clauses	Marked		Unmarked	
	n	n	%	n	%
Psychology	26	11	42%	15	58%
Biology	21	14	67%	7	33%
History	16	7	44%	9	56%

The psychology and history passages were proportionately very close in their percentages of marked clauses (42% and 44%), but the biology passage had a considerably higher percentage (67%) of marked clauses than unmarked clauses. The types of marking also varied in the sample passages and provided a means of identifying the kinds of variations that occur in the sample passages. As

Table 6 illustrates, the psychology passage showed a fairly even distribution of marked clauses in all three types, while the history passage followed a similar pattern in the types of marking, with the exception being the void in the number of rhematizations. The biology passage used all three types of marking, but a very large portion of the marked clauses were of one type only--pseudo-thematization.

Table 6

Types of Marking

	Counseling Psychology	Biology	History
	n	n	n
Thematization	7	2	6
Rhematization	2	1	0
Pseudo-Thematization	3	12	2

As with the numbers of referential, conjunctive, and elliptical ties, the numbers of marked and unmarked clauses and the types of marking used in each passage were too small to draw any reliable conclusions. It is interesting to note, however, the similarities in the distribution of marked clauses in the psychology and history passages and the high number of pseudo-thematizations in the biology passage. The psychology and history passages, for example, have an equal number of thematizations, marked structures in which new information is foregrounded to themic position, either for purposes of focusing the discourse or for setting the stage for the information that follows in the rheme. The biology passage, on the other hand, is characterized by a high number of pseudo-thematizations, a type of marking in

which themic focus is on a modifier of the head word and sometimes on the head word itself. In twelve sentences in the biology passage, what is the new information in the theme is the modifier that receives marked theme-focal pitch, while the head word in the subject remains given information (e.g., Most of the 210-Po....).

This type of marking occurs frequently in the biology passage and partially explains the low occurrence of subordinate topics in the themes of the biology passage in contrast to the psychology and history passages. The number of subordinate topics--i.e., the number of explicit and implicit topics--provides a measure of the degree of embedding in each of the passages. Table 7 identifies the number of subordinate topics in relation to the number of main topics. Explicit topics in subordinate

Table 7

Topics in Subordinate Structures and in Main Clauses

		T H E M E					R H E M E				
			Sub.		Main	Tot.		Sub.		Main	Tot.
		Exp.	Imp.	Tot.			Exp.	Imp.	Tot.		
PSY	n	2	10	12	17	29	40	30	70	7	77
	%	7%	34%	41%	59%	100%	52%	39%	91%	9%	100%
BIO	n	1	1	2	20	22	2	10	12	2	14
	%	4%	4%	8%	90%	100%	14%	72%	86%	14%	100%
HIS	n	5	5	10	13	23	11	9	20	4	24
	%	22%	22%	44%	56%	100%	45%	38%	83%	17%	100%

structures are subjects of adverb clauses, relative clauses, or noun clauses; and implicit topics serve as the subjects of verbals (i.e., infinitives, participles, and gerunds). The percentages of

subordinate structures provides some indication of the syntactic complexity of the sample passages.

The psychology and history passages use a greater number of subordinate topics in the themes than the biology passage, an indication that the themes in biology are not as syntactically complex as the themes in psychology and history. The low number of subordinate structures in the themes in the biology passage should not be surprising, however, because when the subject matter is complex and technical, as it often is in biology texts, the sentence structure is kept relatively simple for easy comprehension. The high number of implicit topics as opposed to explicit topics in the rhemes of the biology passage, contrasting with the other two passages, shows that the writer in biology is careful to avoid highly complex syntax.

The writers of the three passages used proportionately the same number of ties in the themes to manage given information, as Table 8 shows, but employed different types of lexical ties in relating given information to the preceding context. In the rhemes of sentences, the writers used a significantly different number of cohesive ties and showed considerably more variation in the types of lexical ties used.

Of the 160 possible comparisons, almost half (77) of the comparisons of the numbers of lexical ties within themes were significant at the .01 level, and 54 others approached significance. In the psychology passage, 9 comparisons of the numbers of lexical types of ties were significantly different; these differences were mostly in comparisons involving synonymy and collocation. In the biology passage, only 3 comparisons of

lexical types were significantly different; these too involved synonymy and collocation. The biology passage showed only one significant comparison involving the numbers for repetition and collocation. In comparisons among the disciplines, the numbers for repetition, inclusion, and derivation were not significantly different in any of the pairings. However, the numbers for collocations were significant in all pairings at the .01 level, and the numbers for synonyms were significantly different in the psychology and biology passages but not in the other comparisons.

Table 8

Number and Percentage of Lexical Ties in Themes versus Rhemes

	T H E M E / R H E M E					
	PSY	BIO	HIS	PSY	BIO	HIS
	n %	n %	n %	n %	n %	n %
Repetition	47(7%)	39(15%)	16(5%)	166(25%)	50(19%)	48(15%)
Synonymy	31(5%)	10 (4%)	18(6%)	88(13%)	28(11%)	13 (4%)
Inclusion	25(4%)	17 (6%)	20(6%)	102(15%)	47(18%)	43(14%)
Collocation	12(2%)	32(12%)	26(8%)	69(10%)	12 (5%)	43(14%)
Contrast	0(0%)	2(.007%)	4(1%)	5(.007%)	0 (0%)	0 (0%)
Derivation	21(3%)	16 (6%)	20(6%)	97(15%)	10(4%)	67(21%)
TOTAL	136	116	104	527	147	214
% OF TOTAL LEXICAL TIES	21%	44%	33%	79%	56%	67%

Considerably more variation occurred in the subsets of lexical ties in the rhemes in each passage. Of the 160 possible comparisons, only three were not significantly different at the .01 level, all three of them involving the frequency of inclusion

in the history passage, though all three approached significance. All other comparisons were significantly different at the .01 level. In fact, 154 of the 160 comparisons had differences significant at the .001 level, a clear indication that there are very large differences in the ways in which the authors of these three passages presented new information, since the rheme is the portion of the sentence in which the writer usually focuses on information that is new to the reader.

Discussion and Conclusion

The model used in the analysis of these short samples of published writing reveals a large number of significant differences in the cohesion and information strategies employed by the writers of these passages, a number suffficient to suggest that the descriptive model should prove to be useful in comparative studies of representative samples of writing in different disciplines.

If writers from various discourse communities create and share knowledge in different ways, as composition theorists now claim, then textual studies of this kind may contribute details about academic writing that teachers of writing across the curriculum and teachers of reading in the content areas may find useful. Researchers who have taken a social-constructionist approach to the study of texts have produced an abundance of knowledge about writing in the disciplines, and the findings generated by linguistic studies of texts can provide further evidence to substantiate our knowledge of writing in the disciplines. Bazerman (1981), for example, showed in his analysis

of scholarly articles that the literature reviews in each article varied because of differing epistemological assumptions made by the writers within their respective disciplines. He noted, for example, that the writer of the biology text cited evidence that had an immediate bearing on the research topic, whereas the writer of the sociology text "reconstructed" the literature to establish a context for the ensuing discussion. In the biology text analyzed in the present study, the writers cited evidence that related to a narrowly defined research topic, whereas the writers of the psychology text (similar to the sociology text in Bazerman's study) provided a more thorough discussion of the relevant literature in order to establish a context for the ongoing research. One would therefore expect, as was shown, that cohesive density would be greater in the psychology text than in the biology text, and that the flow of given and new information, reflecting the assumptions that the writer makes about the discourse community, would also differ.

Future research needs to look further at the patterning of cohesion devices and the distribution of given and new information in longer passages and from a larger sampling of articles, authors, topics, and genres from each of these as well as other disciplines. It would be interesting, for example, to examine other sections of articles to determine whether different sections of the same article have similar or different statistical distributions, particularly in texts such as articles in scientific journals that follow a formulaic structure containing sections with titles such as "Introduction," "Methods," "Results,"

and "Discussion." By looking at larger samples of texts, we can begin to develop possible schemata, as Vande Kopple (1986) has suggested, reflecting the patterns of cohesion and information management that typify writing within particular discourse communities.

If it is possible to identify the ways information management and cohesion interrelate in writing across the disciplines, not only in professional writing but also in student writing, we may then move closer to an understanding of the difficulties that beginning writers experience in their attempts to compose coherent texts in a variety of classroom settings. Because many disciplines, for example, expect students to learn the language of the discipline, it would be useful to compare professional writing in these disciplines with the writing of students at different levels of preparation. We must also continue to extend the research on cohesion in student texts in order to understand in concrete ways why some texts succeed and others fail.

The abundance of research on cohesion has aimed at trying to understand what kinds of semantic relations link sentences together in good writing in order to see where students go awry in their attempts to produce cohesive texts. In examining both high-rated and low-rated essays to determine whether cohesive ties affected the quality of student writing in these essays, Witte and Faigley (1981) found that the writers whose essays were rated high by English teachers developed their topics more fully, used more cohesive ties, and demonstrated better invention skills and that writers whose essays were rated low used lexical redundancy excessively and tended to overuse interrupted ties (remote and

mediated-remote). One implication of Witte and Faigley's study is that the low-rated writers lacked the skills needed to develop their topics fully by introducing new information as needed. Mosenthal and Tierney (1983), on the other hand, reported that an analysis of cohesive ties cannot provide any reliable measure of textual coherence. After comparing the analysis of cohesive ties in 24 essays written by twelth-graders to teachers' evaluations of coherence in these essays, they concluded that there is "no causal relationship between proportional measures of cohesive ties within topic and coherence rankings within topic" (228). Such contradictory findings, exemplified most recently in the findings reported by Stotsky (1986) and Neuner (1987), suggests that cohesion alone cannot distinguish quality in writing (see Haswell 1988). Witte and Faigley (1981), in fact, were careful to distinguish between cohesion and coherence and cautioned that a correlation between the number and types of cohesive ties and writing quality can be misleading. Good writing, they point out, is "context-bound" and therefore dependent on the writer's ability to establish a clear purpose, to know the subject matter, and to conceive of an audience, all of which contribute to the coherence of a text (202). Thus, in order to identify the textual features of writing judged to be coherent, we need a way to examine cohesive ties in relation to the content or information as it is presented by the writer in a given context. As Enkvist (1985) has noted, "the sentences of a text are not autonomous. Their task is to contribute to the flow of information transmitted by the text, to link up with what went before and with what comes after" (18).

The study of information management, in combination with cohesion analysis, may provide researchers with a useful means of describing differences in writing that has been judged to be of various levels of quality.

Textual research can provide the kind of knowledge that can help teachers become familiar with the nature of the reading and writing that their students are required to do in college classrooms, and that can contribute to the effectiveness and stability of writing-across-the-curriculum programs. If composition teachers are to collaborate successfully with teachers in other disciplines on designing ways to use writing as a medium for learning, then a knowledge of the similarities and differences of writing in various disciplines and their degrees of importance in distinguishing the writing of a particular discipline should be of premium value. In a recent study of writing on the secondary level, Langer and Applebee write that "if teachers are to help students think more deeply about the subject they are studying, then we must begin to articulate the components of effective discourse in particular disciplines" (1988). We cannot assume that biologists, historians, and psychologists write like English teachers. Is it good advice for biology students to "vary their vocabulary," as the handbooks suggest? If the writers of the two science passages had not continued to use the terms <u>first impressions, stereotypes, polonium-210,</u> etc., the purposes of their discussion would have been less clear, and thus their writing would not have been as effective. As teachers of writing and reading, we need to be cautious about how we apply textbook prescriptions about good writing and about how we choose

anthologies of readings that ostensibly serve as models for students to emulate.

Finally, there is much to be learned about how best to convey this knowledge of texts to our students. Research suggests that beginning writers can profit from instruction that exemplifies the semantic and inferential relations within a text and that demonstrates the successful presentation of given and new information in samples of good writing. If we can help our students recognize the cohesive elements and the informational purposes of a text, as reflected in the themes and rhemes in the flow of information, we will be providing students with knowledge that can be used across the disciplines in many kinds of reading and writing tasks.

Works Cited

Anson, C. M. (1987). The classroom and the "real world" as contexts: Re-examining the goals of writing instruction. The Journal of the Midwest Modern Language Association 20, 1-16.

Bazerman, C. (1981). What written knowledge does: Three examples of academic discourse. Philosophy of the Social Sciences 11, 361-87.

----------. (1988). Shaping written knowledge. Madison: The University of Wisconsin Press.

Bizzell, P. (1982). Cognition, convention, and certainty: What we need to know about writing. Pre/Text 3, 213-43.

Brodkey, L. (1987). Academic writing as social practice. Philadelphia: Temple University Press.

Cheong, W. (1970). Syntax of scientific English. Singapore: Singapore University Press.

Enkvist, N. L. (1985). Introduction: Coherence, composition, and text linguistics. In N. E. Enkvist (Ed.), Coherence and composition: A symposium (pp. 11-26). Abo Akademi.

Faigley, L., & Hansen, K. (1985). Learning to write in the social sciences. College Composition and Communication 36, 140-49.

Gopnik, M. (1972). Linguistic structures in scientific texts. Mouton: The Hague and Paris.

Halliday, M. A. K., & Hasan, R. (1976). Cohesion in English. London: Longman.

Haswell, R. H. (1988). Critique: Length of text and the measurement of cohesion. Research in the Teaching of English 22, 428-33.

Hopkins, R. (1979). Popular scientific discourse: A rhetorical model for teaching writing and reading. Unpublished doctoral dissertation, University of Missouri/Columbia.

Huddleston, R. (1971). The sentence in written English: A syntactic study based on an analysis of scientific texts. Cambridge University Press.

Jolliffe, D. A. (Ed). (1988). Advances in writing research, volume two: Writing in academic disciplines. Norwood, NJ: Ablex.

Kinneavy, J. L. (1983). Writing across the curriculum. Profession 83, 13-20.

Langer, J. A., & Applebee, A. N. (Eds.). (1988). How writing shapes thinking: A study of teaching and learning. Urbana, IL: National Council of Teachers of English.

[the author]. (1987). A model for the analysis of cohesion and information management in published writing in three disciplines. Diss. University of Missouri/Columbia, 1987. Ann Arbor: UMI, 1988. #8818951

MacDonald, S. P. (1987). Problem definition in academic writing. College English 49, 315-31.

McCloskey, D. N. (1983). The rhetoric of economics. Journal of Economics Literature 21, 481-517.

Maimon, E. P. (1982). Writing across the curriculum: Past, present, and future. In C. W. Griffin (Ed.), Teaching writing in all disciplines (pp. 67-73). San Francisco: Jossey-Bass Inc.

Miller, C. R., & Selzer, J. (1985). Special topics of argument in engineering reports. In L. Odell & D. Goswami (Eds.), Writing in nonacademic settings (pp. 309-342). NY: Guilford.

Odell, L., & Goswami D. (Eds.). (1985). Writing in nonacademic settings. NY: Guilford.

Porter, J. (1986). Intertextuality and the discourse community. Rhetoric Review 5, 34-47.

Secor, M., Fahnestock, J. (1982). The rhetoric of literary argument. Paper presented at the Penn State Conference on Rhetoric and Composition, University Park, PA.

Swales, J., Najjar, H. (1987). The writing of research article introductions. Written Communication 4 (2), 175-91.

Young, R. E., A. L. Becker, & K. L. Pike. (1970). Rhetoric: discovery and change. New York: Harcourt Brace Jovanovich.

APPENDIX 1

TABLES SHOWING LEVELS OF SIGNIFICANCE OF CHI-SQUARE TESTS OF COMPARISONS OF DATA ON COHESION AND INFORMATION MANAGEMENT

Table 1'

Level of Significance of Chi-Square Tests of Comparisons of Total Numbers of Cohesive Ties in Sample Passages from Three Disciplines

PSY-BIO	PSY-HIS	BIO-HIS	PSY-BIO-HIS
$p < .001$	$p < .001$	$p < .001$	$p < .001$

Table 2'

Level of Significance of Chi-Square Tests of Comparisons of Proportional Use of Types of Lexical Cohesion in Sample Passages from Three Disciplines

TYPES	PSY	BIO	HIS	P-B	P-H	B-H	P-B-H
R	-	-	-	.10	.005	.005	.005
R-S	.025	ns*	.001	.01	.001	.001	.001
R-I	ns	.10	.005	.025	.005	.001	.001
R-C	.025	ns	.001	.005	.001	.001	.001
R-D	ns	.001	.001	.001	.001	.001	.001
R-S-I	.05	ns	.001	.01	.001	.001	.001
R-S-C	.01	ns	.001	.005	.001	.001	.001
R-S-D	.05	.005	.001	.001	.001	.001	.001
R-S-I-C	.025	ns	.001	.005	.001	.001	.001
R-S-I-D	.10	.005	.001	.001	.001	.001	.001
R-S-I-C-D	.05	.01	.001	.001	.001	.001	.001
S	-	-	-	.05	.005	.025	.005
S-I	.05	ns	.025	.025	.005	.01	.005
S-C	.005	ns	.001	.005	.001	.001	.001
S-D	.05	.005	.001	.001	.001	.001	.001
S-I-C	.025	ns	.005	.005	.001	.001	.001
S-I-D	ns	.005	.001	.001	.001	.001	.001
S-I-C-D	.05	.01	.001	.001	.001	.001	.001
I	-	-	-	ns	ns	ns	ns
I-C	.025	ns	.005	.01	.001	.005	.001
I-D	ns	.001	.001	.001	.001	.001	.001
I-C-D	.10	.001	.001	.001	.001	.001	.001
C	-	-	-	.05	.001	.005	.005
C-D	.05	.005	.001	.001	.001	.001	.001
D	-	-	-	.005	.001	.001	.001

CODE FOR LEXICAL TYPES

R--repetition
S--synonymy
I--inclusion
C--collocation
D--derivation

*ns = "not significant"

Table 3'

Level of Significance of Chi-Square Tests of Comparisons of Number of Words in Single and Dual/Multiple Lexical Ties

	PSY	BIO	HIS	P-B	P-H	B-H	P-B-H
Single	-	-	-	.005	.01	.05	.01
Dual/Mult.	-	-	-	ns*	ns	ns	ns
Single/D-M	.025	.10	ns	.025	.05	ns	.05

*ns = "not significant"

Table 4'

Level of Significance of Chi-Square Tests of Comparisons of Total Number of Words in Lexical Ties

PSY-BIO	PSY-HIS	BIO-HIS	PSY-BIO-HIS
$p < .025$	ns*	$p < .01$	$p < .05$

*ns = "not significant"

Table 8t'

Level of Significance of Chi-Square Tests of Comparisons of Proportional Use of Types of Lexical Cohesion in Themes

TYPES	PSY	BIO	HIS	P-B	P-H	B-H	P-B-H
R	-	-	-	ns*	.05	.05	.10
R-S	ns	.025	.05	.005	.01	.005	.005
R-I	ns	ns	.05	ns	.025	.025	.05
R-C	.005	.05	.01	.001	.001	.001	.001
R-D	ns	ns	.025	ns	.01	.01	.025
R-S-I	ns	.05	.10	.025	.025	.005	.01
R-S-C	.005	.01	.025	.001	.001	.001	.001
R-S-D	ns	.05	.05	.025	.025	.005	.01
R-S-I-C	.01	.025	.05	.001	.001	.001	.001
R-S-I-D	ns	.10	.05	.025	.025	.005	.01
R-S-I-C-D	.025	.05	.025	.001	.001	.001	.001
S	-	-	-	.01	ns	.025	.025
S-I	ns	.025	ns	.01	.10	.01	.01
S-C	.001	.005	.05	.001	.001	.001	.001
S-D	ns	.025	.10	.005	.025	.005	.005
S-I-C	.005	.01	.10	.001	.001	.001	.001
S-I-D	ns	.05	ns	.025	.05	.01	.025
S-I-C-D	.01	.025	.10	.001	.001	.001	.001
I	-	-	-	ns	ns	ns	ns
I-C	.005	.05	.05	.001	.001	.005	.001
I-D	ns	ns	.10	ns	ns	.05	.10
I-C-D	.01	.10	.05	.001	.001	.005	.001
C	-	-	-	.001	.001	.01	.001
C-D	.001	.10	.025	.001	.001	.005	.001
D	-	-	-	ns	.10	.10	ns

CODE FOR LEXICAL TYPES

R--repetition
S--synonymy
I--inclusion
C--collocation
D--derivation

*ns = "not significant"

Table 8r'

Level of Significance of Chi-Square Tests of Comparisons of Proportional Use of Types of Lexical Cohesion in Rhemes

TYPES	PSY	BIO	HIS	P-B	P-H	B-H	P-B-H
R	-	-	-	.001	.001	.001	.001
R-S	.001	.001	.001	.001	.001	.001	.001
R-I	.001	.001	.025	.001	.001	.001	.001
R-C	.001	.001	.005	.001	.001	.001	.001
R-D	.001	.001	.001	.001	.001	.001	.001
R-S-I	.001	.001	.001	.001	.001	.001	.001
R-S-C	.001	.001	.001	.001	.001	.001	.001
R-S-D	.001	.001	.001	.001	.001	.001	.001
R-S-I-C	.001	.001	.001	.001	.001	.001	.001
R-S-I-D	.001	.001	.001	.001	.001	.001	.001
R-S-I-C-D	.001	.001	.001	.001	.001	.001	.001
S	-	-	-	.001	.001	.001	.001
S-I	.001	.005	.001	.001	.001	.001	.001
S-C	.001	.001	.001	.001	.001	.001	.001
S-D	.001	.001	.001	.001	.001	.001	.001
S-I-C	.001	.001	.001	.001	.001	.001	.001
S-I-D	.001	.001	.001	.001	.001	.001	.001
S-I-C-D	.001	.001	.001	.001	.001	.001	.001
I	-	-	-	.001	.01	.025	.001
I-C	.001	.001	.025	.001	.001	.001	.001
I-D	.001	.001	.001	.001	.001	.001	.001
I-C-D	.001	.001	.001	.001	.001	.001	.001
C	-	-	-	.001	.001	.001	.001
C-D	.001	.001	.001	.001	.001	.001	.001
D	-	-	-	.001	.001	.001	.001

CODE FOR LEXICAL TYPES

R--repetition
S--synonymy
I--inclusion
C--collocation
D--derivation

APPENDIX 2

METHODOLOGY

A. Method of Coding Cohesive Ties

1. The word count in each of the sample texts was determined by counting sets of letters preceded and followed by spaces--i.e., items written as "words," regardless of pronunciation (e.g., "all right" = 2 words) and regardless of whether an idiomatic phrase effectively functions as a single unit (e.g., "with respect to" = 3 words). Bibliographical information cited parenthetically--e.g., "(Darley and Fazio, 1980; Rosenthal, 1973; Rosenthal and Jacobson, 1968)"--was excluded from the word count altogether, but parenthetical detail relating to the content was included in the word count. The names of authorities cited in the text were counted as one word, regardless of the number of authors cited (e.g., Snyder, Tanke, and Bercheid were counted as one word rather than as four); the fact that multiple authors (as opposed to a single author) contributed to a research project has no relationship to cohesion in the text.

2. Hyphenated words with prefixes or suffixes (e.g., self-control, self-concept, etc.) and proper nouns (e.g., Journalists' Union, etc.) were each counted as one word, while words in hyphenated multiple-word premodifiers, such as day-to-day in day-to-day norms and ego-involving in ego-involving situations, were counted as separate lexical items. Words in compound nouns written as separate words were counted as individual lexical items (e.g., mental patient in the psychology passage--in this context read with the primary-tertiary stress pattern of a

compound noun).

3. Scientific symbols, such as ∝ (alpha), % (percent), and Ci (Curie), were included in the word count because they figure prominently in scientific writing and are important components of cohesive relations.

4. Words entering into cohesive relationships were counted only once, regardless of the number of times they entered into ties. Words that entered into additional ties were placed in quotation marks to indicate that they had already been counted. For example, freedom in sentence 1.4 of the history passage forms an L2 tie with independence in 1.1, but only the word freedom is counted since independence has already been counted in an earlier tie: independence occurs in the phrase professional ethic of impartiality and independence in 1.1, which forms an L5 tie with professionalism in 1.2. Counting all words in multiple ties would have inflated the figures.

5. Words, phrases, and clauses were coded when they entered into cohesive relationships with other lexical elements. When a word, phrase, or clause involved multiple cohesive ties, all ties were coded. However, embedded ties were coded only when they formed a different type of tie. For example, first impressions in more favorable first impressions in 1.3 of the psychology passage is coded three times: as an L4 (inclusion: subordinate) of first impressions in 1.1, as an L1 (repetition) of first impressions in 1.1, and impressions was counted as another L1 since the use of this particular word is a cohesive tie with two occurrences of impressions in 1.1. The two instances of L1 ties in this example are cohesive because the entire passage focuses on impressions in

general and often specifically on first impressions; the first paragraph is about first impressions of physical attractiveness, and the other three are about first impressions and impressions in general of real or assumed mental patients.

6. Semantic ties unique to a text but with unrelated words etymologically were coded along with lexically-related semantic ties. Thus, practitioners in 1.4 of the history passage is a synonym for journalists in 1.1. This semantic relationship is text-based rather than language-based.

7. In the cohesion model, the presupposing item for cohesive conjunctions is coded with a sentence number only, because a cohesive conjunction relates to an entire predication in a preceding sentence.

8. If a cohesive item enters into more than one tie with words or phrases in one or more preceding sentences, the symbol D (Dual ties) or M (Multiple ties) follows the number given in type #7 of the model. The symbol D indicates that the cohesive item enters into one additional tie, and M indicates that the cohesive item enters into two or more additional ties.

9. Only intersentential (as opposed to intrasentential) ties were coded since only these contribute to "texture" in Halliday and Hasan's sense of the term.

Summary and Key to Types of Cohesive Ties

R1--Reference: Pronominals
R2--Reference: Demonstratives and Definite Articles
R3--Reference: Comparatives

E1- Ellipsis: Nominal

C1--Conjunction: Additive
C2--Conjunction: Adversative

C3--Conjunction: Causal
C4--Conjunction: Temporal

L1--Lexical: Repetition
L1a-Lexical: Derivation
L2--Lexical: Synonym or near-synonym
L3--Lexical: Opposition or Contrast
L4--Lexical: Inclusion
L5--Lexical: Collocation

B. Sample Analysis of Cohesion

The three sentences below are the opening sentences of the psychology passage reproduced in the appendix of Part I. The cohesion analysis begins with the second sentence; the first sentence contains no intersentential ties because there is no preceding sentence.

[1.1] Research has demonstrated that first impressions and stereotypes can influence social interactions in ways that lead to their behavioral confirmation--even to the extent of causing mistaken impressions to become real. [1.2] In one study, for example, Snyder, Tanke, and Berscheid investigated the process of behavioral confirmation of the stereotype associated with physical attractiveness. [1.3] Their results revealed that men formed more favorable first impressions of female target persons when they were led to believe that the target was physically attractive than when they thought that she was unattractive.

SAMPLE ANALYSIS OF COHESION

Sent. No.	No. Ties	Cohesive Item	Type	Presupposed Item	Distance	No. of Words in Tie
1.2	7	a. study	L2	a. research	S1.1	2
		b. for example	C1	b. (S1.1)	S1.1	2
		c. process of behavioral confirmation	L2	c. ways that lead to... behavioral confirmation	S1.1	10-M
		"behavioral confirmation..."-1	L4	"behavioral confirmation"	S1.1	
		"behavioral confirmation"-2	L1	"behavioral confirmation"	S1.1	
		d. stereotype associated with physical attractiveness	L4	d. stereotypes	S1.1	6-D
		"stereotype"	L1	"stereotypes"		
1.3	10	a. their	R1	a. Snyder, Tanke, and Berscheid	S1.2	2
		b. results	L4(2x)	b. "study," "research"	S1.2,1	1-D
		c. revealed	L2	c. demonstrated	S1.1	2
		d. first impressions	L4	d. first impressions	S1.1	4-M
		"first impressions"	L1	"first impressions"	S1.1	
		"impressions"	L1	"impressions"	S1.1	
		e. led to	L1	e. "lead to"	S1.1	2
		f. physically attractive	L1a	f. "physical attractiveness"	S1.2	2
		g. unattractive	L3	g. "attractiveness"	S1.2	1

C. Method of Displaying Information Management

The analysis of information management is displayed in four-line segments. Line 1 in each segment displays a line from the text, line 2 identifies topics and comments in the text, line 3 marks given and new information, and line 4 identifies the cohesive items and the types of cohesive ties. Sentence 1.1 in the tables omits line 4 (cohesive items); the opening sentence in each passage contains no intersentential cohesive items because there is no preceding sentence.

The method used to display information management is as follows:

1. Each sentence was first divided into Theme and Rheme, an organizational division based on the pitch contours in the sentence and the distribution of given and new information. In compound sentences, each clause was treated separately.

2. Each sentence was identified as being unmarked or marked with the symbols UM and M placed in parentheses in the left margin of the table below the word theme. Sentences identified as being marked were then coded according to type, as follows: Thematization (Th), Pseudo-Thematization (P-Th), and Rhematization (Rh).

3. All topics were underlined except for deleted topics (e.g., underlying subjects of verbals), which were marked with a lower-case t placed in brackets in the line of text. On line 2, topics were marked with an upper-case T and numbered consecutively (e.g. T1, T2) if they were different topics. Deleted topics were

marked with a lower-case t and likewise numbered consecutively if they were different topics (e.g., t1, t2). Repeated topics within a sentence, whether explicit or implicit, were marked with the same number as the initial instance of the topic.

4. All comments were placed in brackets in the line of text. On line 2, they were marked with an upper-case C at the beginning and end of the comment, followed by a number (e.g., C1, C2). Each comment was numbered consecutively within each sentence.

5. Given and new information were coded on line 3. Given information is represented by a series of lower-case x's, and new information is represented by a series of asterisks. Given information may be presupposable (P), contextual (C), or textual (T) and was so indicated. In pseudo-thematized sentences, new elements appearing in given information in the theme were coded with a series of upper-case N's on line 3.

6. Cohesive items and types of ties were coded on line 4 with the same code as the one used in the cohesion model.

D. Sample Analysis of Information Management

The same three sentences from the psychology passage are used here to illustrate the analysis of information management. The fourth line in each segment in sentence 1.1 is omitted because there are no intersentential cohesive ties in the opening sentence.

SAMPLE ANALYSIS OF INFORMATION MANAGEMENT

```
1.1 Theme:  Research [has demonstrated that
    (UM)         T1   C1
            GIVEN(P)xxxxxxxxxxxxxxxxxxxxx

        Rheme:  first impressions
                        T2
                NEW***************

                and stereotypes [can influence
                     T3         C2,2'
                ******************************

                social interactions in ways that [lead to their
                                                  T4  C3
                ************************************************

                behavioral confirmation--even to the extent of

                ************************************************

                [t] [causing mistaken impressions
                t4  C4
                *********************************

                [t] [to become real.] ] ]  ]   ]
                t5  C5             C5,4,3,2,2',1
                ******************

1.2 Theme:              In one study, for example,
    (M)
    (Th)        GIVEN(C)xxxNNNxxxxxxxxxxxxxxxxxxx
    (P-Th)                      L2       C-1
```

```
Rheme:  Snyder, Tanke, and Berscheid [investigated the
                T1                    C1
        NEW*****************************************
                                      L5----------L5 L2--

        process of behavioral confirmation of the

        *****************************************
        ----------(L4(L1---------L1)L4)L2

        stereotype [t] [associated with physical
                   t2  C2
        ****************************************
        L4(L1)-----------------------------------

        attractiveness.] ]
                      C2,1
        **************
        ------------L4


1.3 Theme:  Their results [revealed that
    (UM)          T1    C1
        GIVEN(C)xxxxxxxxxxxxxxxxxxx
         R-1     L4        L2

    Rheme:  men [formed more favorable
            T2  C2
            NEW**********************

            first impressions of female target persons when

            ***********************************************
            L4(L1-------L1)L4

            they [were led [t] [to believe that the target
            T2   C3         t2  C4                    T3
            ***********************************************
                       L1-------L1

            [was physically attractive] ] ] than when they
            C5                        C5,4,3            T2
            ***********************************************
                 L1a---------------L1a
```

```
[thought that she [was unattractive.] ] ] ]
C6             T3  C7                C7,6,2,1
*************************************
                          L3--------L3
```